

The Study of Biosurfactant as a Cleaning Agent For Insecticide Residue in Leafy Vegetables*

Churdchai Cheowtirakul and Nguyen Dieu Linh

Faculty of Biotechnology, Assumption University
Bangkok, Thailand

E-mail: <churdchaichw@au.edu>

Abstract

Pesticides are used as the main tool for agricultural pest control. Many pesticides are, however, toxic substances and persistent in character. Concern over the pesticide residues in fruits and vegetables have led to the development of many clean up and analysis methods.

Biosurfactant was used in this study to explore the possible potential for cleaning up cypermethrin residue. Lettuce was chosen as a representative for leafy veggy crop. Amounts of biosurfactant and the contact times needed to reduce cypermethrin residue in lettuce to below maximum residue limit of 2 ppm to make it safe for consumers were determined. Salt, vinegar and potassium permanganate are also tested for comparing the cypermethrin neutralizing effect on lettuce with biosurfactant. A simple method to determine cypermethrin residue is developed based on Ninhydrin test which is the reaction of Ninhydrin reagent with free nitrogen to form a color product which can be detected by spectrophotometer.

With the initial pesticide concentration of 100 ppm, the amount of biosurfactant that need to be used is 10 ppm of biosurfactant for 25 minutes, 15 ppm of biosurfactant for 15 minutes and 20 ppm of biosurfactant for 5 minutes. With the initial pesticide concentration of 10 ppm, the amount of biosurfactant that need to be used is 2 ppm for 3 minutes, 3 ppm for 3 minutes, and 4 ppm for 1 minutes minute. Adding $KMnO_4$ together with biosurfactant will cause the synergistic effect that will further enhance the efficiency of this cleaning method. From this study we concluded that biosurfactant can be used as an effective agent to clean up pesticide similar to the group of cypermethrin on leafy vegetables.

Keywords: Biosurfactant, cleaning agent, insecticide residue, leafy vegetables.

Introduction

The economic growth of Thailand largely depends on the agriculture-based industry. The agricultural sector is very important to Thailand as a source of export revenue and a part of a strategy to alleviate poverty through employment and subsistence.

In the past decades, vegetable production

in Thailand has experienced considerable problems: increased competition for land and labor from rapid urbanization and industrialization has put pressure on traditional peri-urban vegetable production sites.

Agricultural chemicals, including pesticides have made significant contributions to the efficiency and productivity of Thai agriculture, making sure that the rise in Thai food production has kept ahead of its growing population. Responsible pesticide use delivers important benefits to agriculture and in turn society, such as: year round availability of agricultural produce; improved quality and variety; and reduced production costs which in turn results in lower prices for consumers.

* Paper presented at the 22nd Biennial Conference of the Asian Association for Biology Education (AABE), ANA Gate Tower Hotel, Osaka, Japan, 21-24 November 2008, Paper P-05.